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Rockwell (A. D.,)

ON THE TREATMENT

OF

PARALYSIS BY ELECTRIZATION,

WITH AN EXPLANATION OF A

NEW GALVANIC APPARATUS.

BEING A PAPER READ BEFORE THE N. Y. ACADEMY OF MEDICINE, NOV. 19TH, 1868.

BY

A. D. ROCKWELL, M.D.,

FELLOW OF THE ACADEMY.

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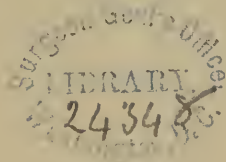
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# ON THE TREATMENT OF PARALYSIS,

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Read before the New York Academy of Medicine, November 19th, 1863.

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MR. PRESIDENT AND GENTLEMEN :—The chief aim of the paper which I am to present to you to-night, will be to call your attention to the treatment of paralysis, by the scientific use of the galvanic and faradaic currents. But in the brief time that is allowed on this occasion, it will be manifestly impossible for me to enter into anything like a full or complete detail of the operations that I shall describe, or to answer even a tithe of the various queries that will very naturally arise, concerning a system of treatment at once so complicated and unfamiliar. I shall therefore not attempt to be exhaustive, but shall confine myself to general principles—illustrated by special cases—content if I only succeed in making clear to you what I regard as the true scientific basis for the employment of electricity in the very frequent and distressing affection that we call paralysis. And in order to accomplish this important and special object, it will be necessary to waive all mere theorizing concerning pathology, and to avoid all discussion of words and names, to omit all elaborate descriptions of apparatus, and to confine myself to that which I regard as thoroughly established and of direct practical importance.

The name paralysis (derived from *παρα* and *λυω*, to loosen) of itself means nothing, and conveys but little idea of the nature of the affection it is designed to express. It sprang up, like most of the names—especially of our nervous diseases—in dark and ignorant times, when men knew so little of pathology or physiology, that they were obliged to designate all mysterious affections by some predominant symptom.

The attitude of the profession toward paralysis has, thus far, been that of neglect and discouragement.

The paralytic has been suffered to endure his affliction as though it were a special judgment from Heaven, against which to invoke the aid of science would be sacrilege. The reasons for this dis-

couragement and neglect on the part of the profession and the people, are threefold :

In the first place, there have been very few who have attempted to make any differential diagnosis in the various forms of paralysis. We have forgotten that paralysis is merely a name, a symptom, or an effect of many diverse pathological conditions.

Cases of paralysis dependent on myelitis, congestion of the spinal cord, meningitis, effusions on the brain, and those caused by reflex action, or by nervous exhaustion, have been grouped together, and have all received the same prognosis and the same treatment. The tendency has been to content ourselves with the vague diagnosis—paralysis—which is really no diagnosis at all, and conveys no idea whatever of the indications for treatment.

Secondly—We have been in the habit of deferring the treatment of paralysis until too late. The custom has been to do nothing until the eleventh hour, and then oftentimes to do just the wrong thing. The palsied patient does not usually suffer the great pain that is connected with many other affections, and therefore is more easily tempted to put off all remedial measures until the muscles have become so atrophied, and the general system so exhausted, that recovery is impossible.

In the third place, our discouragement in the treatment of paralysis is largely due to our want of skill, adaptation and perseverance in the application and administration of remedies.

We have left the details of our rubbing, or passive movements, or electrization, to hireling attendants or careless servants, who know nothing of any subject, and least of all of the science or practice of medicine. We have prescribed batteries, as we have prescribed boluses, to be used at bedtime, and with even less supervision of the practical details.

These *three* reasons are, I think, sufficient to account for the present unsatisfactory state of the therapeutics of paralysis. There are two very strong arguments why the profession at the present time should give more direct and special attention to the treatment of this affection.

1st. It is certainly increasing in frequency. We think that all our older practitioners agree that hemiplegia, paraplegia, and what has been termed infantile paralysis, are much more frequent now than they were 30 years ago. The same is probably true of all phases of nervous diseases.

2d. With our present means and appliances for treatment, paralysis is much more relievable and curable than formerly.

The principles on which the recent and more successful methods of treatment of paralysis are based are, 1st, internal remedies directed to the removal of the cause; and 2d, external applications designed to counteract the effects, to improve the nutrition of the palsied muscles, and to give tone to the benumbed nerves. Accordingly we give strychnine in paralysis dependent on anæmia or exhaustion of the nervous centres; ergot, belladonna, and iodide of

potassium in the opposite conditions of congestion and inflammation.

We give bromide of potassium to calm the irritated nerve-centres and to reduce the volume of blood in the cranium, and phosphorus as chemical food for the brain.

In order to fulfil the second indication, the prevention of muscular atrophy and the restoration of nutrition in the affected parts, we employ rubbing, passive movements, and electrization. The latter remedy meets both of these indications better than any other that we know of. It is a tonic to the nervous system, and, like all other tonics, exercises a calming, soothing, and quieting influence on the brain and spinal cord.

Like other tonics, also, it increases the appetite, quickens the circulation, and makes the sleep more profound and refreshing. It is by virtue of these tonic effects that it is so markedly efficacious in paralysis.

Electricity, in some form or other, has been used for paralysis for more than a century. Authenticated cases of perfect cures have been reported, that have resulted from a stroke of lightning. In its earlier days, the voltaic pile worked wonders in this department, but the current it afforded was unreliable and inconstant, and therefore it caused more failures than successes. Until the discovery of the faradaic current by Faraday, a convenient apparatus for electrotherapeutical purposes was impossible to be obtained; and the most trying annoyances that we have experienced in all our investigations in the department of electrotherapeutics, have been our repeated failures to obtain a convenient and satisfactory galvanic apparatus. This beautiful combination, which I now present to the Academy, was manufactured for us by Messrs. Chester & Co. It was not completed until after considerable labor and investigation, and many annoying details that can only be appreciated by those who have attempted similar experiments. The apparatus may be composed of any number of elements that may be desired. Seventy-five or one hundred, or at most one hundred and fifty cells, will be sufficient for nearly all the ordinary purposes of electrotherapeutics. The cells are each three inches long and are inserted in a wooden block. Each glass is provided with a zinc cover, from which a projection runs down into the glass, thus forming a zinc element. The other element is carbon, carefully connected with platinum, and well insulated from the zinc cover. Between this cover and the glass top, a piece of soft rubber is interposed, and the packing is made completely *air-tight* and *water-tight* by the pressure of two rubber sponges that pull the cover firmly down.

Connection between the cells is readily made by means of spiral springs. The battery is charged by filling the glasses half full of water, adding some bisulphate of mercury.

A small bit of cloth is interposed between the plates so as to retain moisture. To use the battery we invert it, thus allowing the



fluid to flow over the plates and moisten the cloth. It should be kept inverted but for a short time, and then it should be restored to its natural position. While the apparatus is inverted, and for some time afterward, the current of electricity may be felt by taking hold of the electrodes. The strength of the current, and the length of time it can be felt after the immersion, will depend on the number of cells of which the apparatus is composed. In an apparatus composed of 100 cells, a powerful current has been felt for many hours after inversion. In any apparatus all the cells may be used, or only a part of them, according as a strong or weak current is desired.

The first question we are to ask ourselves, when one is presented to be treated by electrization for the relief of paralysis, should be, Will this method of treatment do harm? It has been commonly supposed, and so taught by some of the European writers on electro-therapeutics, that the faradaic current is harmful in hemiplegia following cerebral effusion, until many months have elapsed from the date of the attack.

When extensive laceration of cerebral tissue has taken place, it is obvious that the paralysis will, in all probability, remain permanent, and that electricity will be of but little value. But when there has been *merely* an effusion of blood, the symptoms are caused by a clot which has formed and which separates and compresses the cerebral substance, without producing great destruction of brain tissue. In such a case the health of the patient may be approximately if not completely restored. As a rule, however, we should not wait six months, or even six weeks, before resorting to electrization, but begin the treatment almost immediately, and direct it especially to the paralyzed motor nerves and muscles. Benedict of Vienna, the best German authority in electro-therapeutics, treats hemiplegia by localizing the galvanic current directly through that side of the brain in which the clot or other lesion is supposed to exist.

Another German writer also reports some quite favorable results with the same method of treatment. We have for some time been accustomed to apply both the galvanic and the faradaic currents through the head in cases of hemiplegia, and with apparently beneficial results. It is by no means impossible that the current, when thus used, may hasten the absorption of the clot.

In these cases, however, nature is the great restorer, and it is only in a very humble way that our services can be of value. The absorption of the offending clot is a painfully slow process. A long time may elapse before there is the slightest indication of improvement, and months, and even years, frequently pass before nature has so completed her work that the paralyzed extremities are of any considerable service. While the process of absorption is going on, the muscles of the affected limbs, from disuse and the want of the usual brain stimulus, suffer from slow but certain atrophy and degeneration, and when the great nervous



centre is in a great measure restored to its normal condition the extremities may have been irreparably injured. The electric currents undoubtedly prevent muscular atrophy and fatty degeneration of tissue, and a considerable experience teaches that if used promptly, persistently, and effectively, after cerebral effusions, we should see fewer permanently crippled conditions as sequels to paralysis. As illustrative of the above principle, I will briefly mention a case that is still under observation. The patient is a stout, plethoric man, somewhat past the prime of life. For years it had been his custom to drink five or six times of brandy daily, although he rarely became intoxicated.

During the early part of the present year, while stepping from a Third Avenue car, he became unconscious and fell to the ground, and, although he arose by his own unaided efforts, and walked several blocks to his own house, he remembered nothing of the act. His reason returned several hours subsequently, when his right side was completely paralyzed. He remained perfectly helpless for several weeks, when a certain degree of strength gradually returned, so that, by the aid of a cane, he was able to walk short distances. He first observed some decrease in the size of the limb about six weeks after the attack, and when he was sent for treatment by electrization, the thigh had decreased in circumference one inch. There was considerable diminution of electro-muscular contractility in the affected leg, besides a marked decrease of the normal temperature. The faradaic current alone was used, and in six weeks' time, after receiving twenty applications, the limb had increased in circumference half an inch, the muscular contractions were normal, and but little difference could be noticed between the temperature of the two limbs. In the treatment of this case it was not supposed that we should be able to remove the cause.

The process of absorption goes on so slowly, that the clot still remains, and it will be many months, if ever, before he regains his previous strength and vigor. The atrophy of the muscles was, however, at once arrested. The normal electro-muscular contractility was restored, the temperature of the limb was increased several degrees, and its nutrition generally was much improved.

The efficacy of the galvanic current in paralysis resulting from spinal congestion, and its superiority over the faradaic, were illustrated in a most decided manner in a case that is now under the treatment of Dr. Beard. The history of the case was that general debility had produced spinal exhaustion, and spinal exhaustion had extended to congestion, which had resulted in paralysis of both the upper and lower limbs. When first seen with Dr. Alexander, of Staten Island, she could not move her lower limbs at all, and had very little power over her arms and hands. The interossei were beginning to atrophy. The faradaic current had been used with slight benefit to the upper limbs, but with

none whatever to the lower extremities. Five or six applications of the galvanic current, from Chester's air-tight galvanic battery of sixty cells, produced immediate results. She could raise her feet and bring her arms to her head. After six weeks of treatment the atrophied muscles are returning to their normal condition. She is beginning to feed herself, which she had not attempted to do for several months before. She can sit for an hour in a nearly natural position, and with assistance can stand for a moment in an upright position. The patient is still under treatment.

But there are paralytic conditions in which electrization is not only useless, but may result in positive injury to the patient. The contra-indications for its use were very marked in the case of a woman who consulted us eighteen months since. In the morning, while dressing, she was prostrated instantly, and for several hours remained unconscious.

Her intelligence returned only partially after the lapse of twenty-four hours, but the paralysis of the right side was complete. Four weeks subsequently, when some slight power of motion had returned, an application of the faradaic current was made to the affected parts.

The diseased limbs were remarkably susceptible to the influence of electrization. A current of very ordinary intensity, and sufficient to produce contractions on the healthy side, would instantly cause the muscles of the paralyzed limbs to become violently convulsed.

An application of a few moments only was invariably followed for the time being by a complete loss of the little power regained by the paralyzed muscles.

After the experiment had been tried a number of times, it was evident that the patient had lost rather than gained strength, and the treatment was discontinued. According to the experiments and researches of Dr. Todd, the marked exaltation of the nervous force in this case doubtless depended upon an irritative lesion of the brain. Dr. Althaus and others relate cases similar to the above, caused by repeated attacks of apoplexy, by a tumor pressing upon the brain, and in some instances—as in the case just related—by a single apoplectic seizure. When, therefore, in a case of hemiplegia, the electro-muscular contractility of the paralyzed limbs is greatly increased, we may conclude that the patient is suffering from an irritative lesion of the cerebral tissue, and electrization in any form is contra-indicated. Another question that arises in the treatment of paralysis by electrization, concerns the kind of current to be used, whether the faradaic or galvanic.

No. 42, Vol. 2d of the *N. Y. Medical Record* contains an article on Reflex and Organic Paralysis, by Dr. Geo. M. Beard and myself, in which is detailed a case illustrating so decidedly the varying effects of the two currents, that I beg leave to refer to it. Miss P——, a stout, vigorous young lady of fifteen, was sent to us

by Dr. F. Elliot, to be treated for paralysis of the 7th pair on the left side, caused by exposure to a draught of air two months previous. The paralytic symptoms came on suddenly and in full force immediately after the exposure, and at first she experienced great difficulty in speaking. She gradually became so accustomed to the abnormal condition of her lips and face that she was able to converse almost as clearly as before, but the improvement in the condition of the paralyzed muscles was very slow, and at the time she came to us the affection appeared to be almost stationary. At the time she received the first application at our hands she presented most of the usual symptoms of paralysis of the 7th pair. Her mouth was drawn over toward the healthy side so violently as to produce considerable deformity when she laughed or conversed, and even when she smiled. When she attempted to frown the left brow remained as smooth as that of a child.

Her left eye rolled up, and when she attempted to close it the lids would not approach nearer than  $\frac{1}{4}$  of an inch to each other. A powerful faradaic current localized in the affected muscles produced very feeble or imperfect contractions; while on the sound side a very mild current, applied with the hand, produced active contractions of all the principal muscles.

The patient was so well in all other respects that we decided to use only partial or localized electrization over all the muscles on the left side of the face. Two vigorous applications made in this way—one electrode being placed firmly below the ear, and the other passed over the ramifications of the 7th pair, as well as over the individual muscles—did not seem to increase, to any appreciable extent, the electro-muscular contractility, and accordingly we resolved to adopt an entirely different method of warfare. The next time we localized the galvanic stream through the left side of the face, and with most charming results. Contractions of the paralyzed muscles were at once produced that were as vigorous as those caused by the faradaic current on the healthy side. The patient began at once to improve, and after ten visits, distributed over a period of six weeks, she was dismissed as approximately cured. There still remained some deficiency of action of the muscles concerned in frowning and in winking, but the expression of her face, both in repose and in conversation, was normal. The very little that remains nature ought to accomplish unaided.

The interesting points in this case are as follows:

*First*—The galvanic current produced contractions and wrought a cure, when the induced or faradaic utterly failed. This important fact with regard to the galvanic current, viz.: its power of causing contractions in paralyzed muscles that do not appear to be affected by the faradaic, was first pointed out by the late Prof. Remak, of Berlin, whose original and able researches in electrotherapeutics\* really made him the father of a distinct school of electricians in Germany, as Duchenne has long been in France.

\* Ueber Method. Electricisirung Gelähmter Muskeln. Berlin, 1865.

Though the ideas advanced by Remak were at first scouted and despised by the profession, as indeed has ever been the case with all original suggestions in science, and although his own impetuosity and extravagance hurled him into generalizations that could not have stood the test of investigation, yet his leading idea in regard to the superiority of the galvanic over the faradaic current, in some forms of paralysis, is now as fully established as any fact of science among those who are practically familiar with electrotherapeutics. These observations of Remak have recently been confirmed in a very striking manner by Prof. Ziemssen,\* of Berlin, by Schulz, Meyer,† Baierlacher, Neumann, and Hammond.

*Second*—The paralyzed muscles were at first brought to contraction by a galvanic stream of small quantity, but of considerable intensity, that had no effect whatever on the muscles of the healthy side. As the patient improved, however, it became necessary to use a stronger galvanic stream in order to produce the contractions. Toward the close of the treatment the muscles of the paralyzed side began to respond to the faradaic current. These apparent inconsistencies had also been previously observed by a number of the German electricians already mentioned. The late P. Victor Bazire‡ has recorded an experience almost precisely similar.

It does not follow from these facts that the relative value of the two currents is entirely undecided. On the other hand, it may well be questioned whether we do not know nearly as much of the indications of their use and the rationale of the operation of their currents as of any of the internal remedies that are styled specifics. In general electrization, for the purpose of producing a constitutional tonic influence; in partial electrization, with a view to calmative or absorbent effects, and for most cases of localized electrization, we use the faradaic current.

On the other hand, for those exceptional cases of paralysis where the faradaic current will not produce contractions, and when it is desired to affect the retina, we use the galvanic.

We have now under treatment three cases of infantile paralysis, two of which are evidently reflex in character, caused respectively by exposure to cold during the irritative process of teething, and by persistent digestive disorder. In both cases the paralysis was complete. No intensity of the faradaic current which we felt justified in applying to the affected arms produced the slightest effect, but when a galvanic current of moderate power was made use of, the muscles of the paralyzed responded almost as readily as those of the healthy side. The improvement in the condition of the little patient, whose paralyzed limbs resulted from the combined causes of cold and teething, has been very satisfac-

\* Die Electricität in der Medicin. Berlin, 1866.

† Die Electricität in ihrer Anwendung auf Pract. Med. Berlin, 1861.

‡ Notes to Translation of Trousseau's Lectures on Clinical Medicine. Part II, p. 331



tory. He has regained full power over the hand and forearm, but is still unable to raise the arm readily from the side. Notwithstanding the approximation to a perfect cure, the faradaic current will as yet produce only feeble contractions, while under the influence of the galvanic current the electro-muscular contractility is vigorous.

In the other case the improvement is far less rapid.

There is not the slightest evidence of reflex movement in the diseased arm, and the faradaic current is entirely inoperative in its effects. The galvanic current will, however, produce some considerable contraction of the muscles, and it is evident that whatever favorable results are to be obtained by electrization must come from the persevering use of this form of electricity.

The third case of infantile paralysis to which I referred, occurred in the person of an infant aged fourteen months.

The left leg was entirely powerless, and although the muscles responded with impaired vigor to the galvanic stimulus, the faradaic current produced no contractions whatever. The paralysis had existed eight weeks, but in this case the galvanic current produced results quite unexpected, and I think unusual, for in ten days the child was approximately cured.

A marked feature in the effect of electrization with the faradaic current on very young children, is the difficulty with which muscular contractions are produced. Not infrequently we find it impossible to cause the muscles to respond in the slightest degree to the stimulus of an induced current of sufficient intensity to excite powerfully the electro-muscular contractility of the limbs of an adult person. This phenomenon is due, probably, in part, to the great quantity of adipose tissue which surrounds and covers the muscular substance of infants, as well as to the insusceptibility of the undeveloped muscular and nervous tissue to the influence of the electric current.

The leading ideas that I have sought to advance in this essay to-night may be summed up in the following propositions:

1st. Paralysis is not a disease, *per se*, but is merely a symptom of some disturbance of the central or peripheric nervous system. Our treatment of paralysis, whatever system we adopt, should have reference not alone to the affected parts, but also to the general condition of which it is the result, or with which it is associated.

2d. Paralysis—throwing aside the toxic, traumatic, and local varieties—is pre-eminently a symptom of exhaustion or weakness of the nervous system. Therefore it is increasingly frequent under the pressure, and haste, and nervous strife of our high civilization.

It occurs most frequently among the cultivated and the intellectual. Therefore, also, we should naturally expect it is most liable to attack those constitutions that exhibit a tendency to nervous disorders, and at the period of life when the nervous system is most susceptible to disease. Accordingly we find that

paralysis, though it may and does attack all ages, is peculiarly a malady of the two extremes of life—infancy and old age.

3d. The two cardinal principles of treatment of paralysis are, in the first place, to administer remedies directed to the removal of the cause, that is, the condition of the system, or the local injury of which the paralysis is a symptom; and in the second place to restore the tone and nutrition of the affected parts. The first condition is met by the administration of strychnine (internally or hypodermically) when the central nervous system is anæmic; in the use of iodide of potassium, ergot, belladonna, and bromide of potass., when the spine or brain is congested or inflamed; and by the use of general tonics, such as bark, iron, phosphorus, arsenic, and oxide of zinc.

The second condition is met by rubbing, shampooing, &c.

Electrization, general or localized, with the varying use of the galvanic or faradaic currents, by the consent of nearly all our modern neurologists, fulfils these indications better than any other method of treatment. It benefits paralysis by virtue of its tonic effects on the nervous and muscular system. This is indeed the only scientific basis for the employment of electrization, not only in paralysis, but in every other form of nervous disorder.

General electrization, like the other tonics—strychnine, bark, iron, sunlight, &c.—is primarily stimulating, but, like these other tonics also, its permanent effects are to strengthen, to calm, to soothe, to sharpen the appetite, to increase the digestive capacity, to lengthen and sweeten repose, to restore the languid circulation, to improve nutrition, and consequently to cause increase in size and weight.

It is by virtue of these constitutional tonic properties that electrization benefits paralysis.

4th. In the treatment of paralysis by electrization, the distinction between the effects of the galvanic and faradaic currents is of *radical and indispensable importance*. An intense, penetrating galvanic current, from 50 or 100 cells of Chester's air-tight battery, will overcome far greater resistance than the faradaic; will produce muscular contractions in paralyzed limbs where the faradaic is powerless; and will also more directly and positively affect the great sympathetic.

A neglect of these vital distinctions is one of the many causes of our failures in the use of electricity for paralysis.

The magneto-electric machines, in which the electricity is generated by turning a crank, are inconvenient and unreliable, and, especially when unscientifically used, have done the cause of electro-therapeutics almost irreparable injury.

5th. In the treatment of paralysis by electricity, we should first of all make a differential diagnosis, and then studiously adapt our treatment to each individual case. Fresh recent attacks of a local character are sometimes very quickly relieved and cured by the faradaic current alone, but long-standing and severe cases,

that constitute the majority, demand the varying and persevering use of both the galvanic and faradaic currents for weeks and months.

We feel the necessity of ever keeping in mind the expressive words of the great Trousseau: "Chronic diseases demand chronic treatment."

6th. The prognosis of paralysis, taking the cases as they run, without reference to their pathology, is far more favorable, at least when treated on the principles here indicated, than is commonly supposed. None need be injured by the treatment here described, while many cases are decidedly ameliorated, and a respectable minority are permanently cured. During the past two years we have treated by electrization, general and local, and by the varying use of the faradaic and galvanic currents, 70 cases of paralysis, resulting from a variety of causes, and manifesting itself in different parts of the body. It may be interesting to sum up briefly, and in a general way, the results of the treatment. Of these 70 cases, 16 were supposed to result from cerebral effusion, causing hemiplegia; of this number 11 suffered from paralysis of the right, and 6 of the left side.

Three of the cases were approximately and two completely cured; three were very markedly benefited; three discontinued treatment after a few visits; in three cases only slight amelioration was evident, while two failed to receive any benefit whatever.

Four cases of complete facial paralysis, two of which involved the right side, one the left, and one both sides of the face.

With the exception of the case involving the 7th pair on either side, and which probably resulted from organic change, following syphilis, they were all quickly and completely cured. Anæsthesia occurred 20 times. In nine cases the cure was complete; nine of the patients were approximately cured, while two discontinued treatment before any result could be seen.

Four cases of complete paraplegia, three of which received no benefit whatever, while one was approximately cured after a protracted course of treatment. One of the patients died while under treatment. The myelitis from which she suffered gradually extended upward, and paralyzed the vital organs.

Eight cases of infantile paralysis, probably of a reflex character. Four of these patients were completely and rapidly cured, and two were approximately cured, while two received no benefit whatever.

We have treated 12 cases of paralysis, each of which involved but one limb of the body. One of these was approximately, and five completely cured; four derived marked benefit, while two discontinued treatment before any result was noticed.

Four cases of palsy agitans, but in one case only have we succeeded as yet in obtaining even a slight amelioration of the symptoms. Writer's cramp occurred twice. One patient recovered



considerable power in the affected hand, while the other experienced no relief worthy of mention.

This aggregate result, though perhaps not brilliant, is certainly most encouraging, and will, I think, compare not unfavorably with the record of treatment of any other severe type of chronic disorder.

The old and familiar Roman maxim, "*Principiis obsta*"—"Stop the beginnings"—is of pre-eminent importance in the treatment of paralysis. If we could at once and forever discard the error that electrization is merely an irritant and a stimulant, and rise to a clear and full appreciation of its tonic and soothing powers; if we could remember to begin our treatment of paralysis in its earlier stages, before weeks and months of neglect have exhausted the general tone of the patient, and shrivelled his palsied muscles, then I am sure that a new history and a new era would open for one of the most common and most distressing maladies of our time.







